INDIANA UNIVERSITY

SCHOOL OF PUBLIC AND ENVIRONMENTAL AFFAIRS

Honorable Mitchell E. Daniels, Jr., Governor
Office of the Governor
200 W. Washington St., Rm. 206
Indianapolis, IN 46204

Re: Review of BP-Whiting Refinery's permit to discharge to Lake Michigan

Dear Governor Daniels:

You have asked for a review of the wastewater permit issued by IDEM in June 2007 to British Petroleum's (BP) Whiting Refinery and for: (1) an assessment of whether it was issued in compliance with applicable state and federal laws, (2) an evaluation as to the potential of the permitted discharge to adversely affect Lake Michigan's quality and use as a source of drinking water, recreation, and aquatic life, and (3) an assessment of whether the existing laws are sufficiently protective of the Great Lakes system.

Pursuant to this charge, I have, among other things: (1) reviewed the publicly available documents concerning the permit and its issuance as well as a wide range of other materials; (2) met with IDEM and EPA officials involved in the processing and review of the permit application; (3) met with representatives of several public interest groups who are active in Great Lakes issues and talked with representatives of several industry associations whose focus is development in the Great Lakes states; (4) met with representatives of BP; (5) reviewed press reports and other documents to identify issues that have been raised by others concerning the permit; (6) consulted with Dr. Jeffery White, an environmental scientist/engineer in the Indiana University School of Public Affairs whose expertise is in water chemistry and wastewater technology; and (7) consulted with several former senior EPA officials to ascertain their judgments as well.

In conducting the review, I have focused on what I believe to be the most important steps in the process and on the most critical judgments IDEM and EPA made in the course of approving/issuing the permit—as well as on the issues that have been raised by persons critical of the permit. My goal in submitting these findings and recommendations to you in the attached report is to present them in a succinct manner that provides you the essential context and rationale for those findings and recommendations.

At the time I took on the assignment and read published accounts of the controversy, I thought I would be reviewing an epic environmental decision that pitted the nation's need for a reliable source of petroleum products against the well-being of a national treasure, Lake Michigan. After working methodically through the matter, what I found was that this was, in most respects, a very straightforward permitting action undertaken in a regulatory

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regime where Indiana is in some respects actually more protective of Lake Michigan than adjoining states.

The controversy was fostered, in part, by some initial press reports that mischaracterized the wastewater authorized to be discharged as "sludge." At the core of the controversy are some gaps and areas that lack needed clarity in the Indiana regulations for Lake Michigan that implement a concept known as antidegradation. This concept involves the question of when, and the extent to which, new or increased discharges of pollutants will be permitted so long as the discharge will meet legal requirements that protect the quality of the receiving water. The public, the regulated community, and the regulators have different perceptions on what the antidegradation policy is for Lake Michigan and the mechanisms by which it is, or should be, implemented.

These competing perspectives collided in the instant matter because the regulatory requirements were not as clear as they need to be to serve the legitimate interests of the regulated community, the regulators, and the public. The regulated entity (BP) thought it had a legally issued permit that met the explicit legal requirements and could be relied upon as the company proceeded with the modification of its facility. The regulator believed that it had issued a legally and technically sound permit—and is unsure of how to deal with what it views as requests for actions outside the current regulatory construct. Many in the public, however, do not understand why an increase was allowed; they believe the Indiana antidegradation process is opaque and the apparent legal standards at odds with their view of antidegradation--and they view with considerable suspicion the asserted basis for allowing the increased discharge.

The most significant findings from my review are:

- The permitting process for the BP-Whiting refinery that was implemented by IDEM complied with existing regulations and the permit complies with the explicit requirements of state and federal law. If the discharges from the facility are limited to those in the permit, the diffuser works as designed, and the other assumed conditions hold, the wastewater discharge would not be expected to cause a violation of water quality standards or interfere with designated uses in Lake Michigan (including full body contact recreation such as swimming, maintaining the aquatic community, and drinking water supply).

- The limitations in the BP permit are as demanding, and in several instances much more restrictive than, those issued by adjoining states to refineries. The limits on ammonia are much more restrictive, and the total suspended solids (TSS) limits more restrictive, than those in the permit for the most comparable refinery on the Great Lakes, which recently was allowed to increase

the discharge of those pollutants as it increased its utilization of extra-heavy Canadian crude feedstock.

- EPA reconfirmed that it considers Indiana's antidegradation regulations to be in compliance with EPA's Great Lakes Water Quality Initiative Antidegradation Policy. In fact, with a flat ban on new or increased discharges of bioaccumulative chemicals of concern (BCCs) to Lake Michigan resulting from a deliberate action by a permitee, Indiana is more protective of the Lake than the adjoining states. Indiana also has designated all of its waters in Lake Michigan as an "outstanding state resource water" deserving of special protection.

- A number of circumstances unique to this particular re-permitting illuminated certain gaps and a lack of desired clarity in the Indiana antidegradation regulations for waters of the Great Lakes system. For example, the regulations do not spell out when a permit applicant seeking to increase a discharge to Lake Michigan must submit an antidegradation demonstration, what the content of that demonstration must include, and the standard by which a decision as to an increase will be made. The BP permit was the first permit that IDEM issued under these regulations. Although IDEM, to its credit, sought to compensate for those shortcomings, there was not a clear understanding as to (1) what level of increased discharge would be considered to constitute a significant lowering of water quality and (2) what information BP was to submit. Consequently, the information ultimately submitted on the record by BP fell short of what IDEM initially requested and ideally needed to make a decision as to whether, and to what extent, the increases should be allowed. As a result, the determination that the increased discharges are "necessary" lacked the factual support in the public record and a clear articulation of the legal standards by which the decision was to be made; both of which are needed in order for the decision to be seen as credible by the public.

- Indiana should clarify its antidegradation regulations for Lake Michigan to make them easier for permit applicants and the public to understand and for the agency to apply. Specifically, the regulations should clearly spell out: (1) when an applicant seeking permission for an increase in its discharge to the Lake must submit an antidegradation demonstration; (2) the required content for such a demonstration; (3) the legal standard by which the adequacy of the demonstration will be evaluated and any increase allowed; and (4) the process by which the public can comment on the demonstration, ideally before the agency makes its decision concerning it in a draft permit.

- The initial press reports that mischaracterized some of the material BP is authorized to discharge as "sludge" created a misconception in the minds of many members of the public and public officials that does not accord with the actual facts in this case. The treated wastewater that IDEM has authorized BP to discharge is not industrial sludge (the material that is removed from the process water by the waste treatment process)—and BP could not legally be authorized to discharge such material into the Lake, nor could it put it on land in a way that the material ultimately would find its way into the water. The wastewater discharged to Lake Michigan does contain very small quantities of materials that are not removed in the wastewater treatment process. To make clear what the discharge to the Lake resembles I would note that the amount of ammonia authorized to be discharged is the equivalent of one *drop* (from an eyedropper) of ammonia in a pint of pure water. The amount of TSS (small discrete particles that remain suspended in the wastewater and do not settle out or are not filtered out in the treatment process) is the equivalent of 10 *grains* of sand in a pint of pure water.

I also have identified a number of systemic improvements that EPA and the Great Lakes states might consider and have set them out in the Recommendations section of the attached report.

Finally, I would be remiss if I did not pass along several general observations. First, knowledgeable observers in both the environmental and business communities gave IDEM and its commissioner, Tom Easterly, credit for cutting the backlog of expired permits and for their efforts to engage the public early in the permit process. The comments critical of the BP permit matter were focused primarily on the need to improve the process for implementing the antidegradation policy in the Great Lakes and to make the process and decisions more transparent—and thus more likely to be perceived, and therefore accepted, by the public as reasonable.

Second, this controversy did not take the form of "I do not want a refinery in my backyard—close it down." Rather, I found that those interested in the well-being of Lake Michigan understand the importance of having a reliable source of petroleum products in the Midwest and want to be assured that BP is doing what it reasonably could—and should--do as it undertakes this expansion/conversion to be a good neighbor and to avoid or at least minimize potential adverse effects on a treasured resource.

By modifying the regulations to address the shortcomings that I identified, Indiana can readily provide a more transparent process with clear requirements for making antidegradation decisions regarding the Great Lakes

so the people of this state, and other states, concerned about the quality of the Great Lakes are more likely to view permit actions as reasonable.

I would be happy to respond to questions that you or others may have about the review and its findings.

Sincerely yours,

A. James Barnes
Professor of Public and Environmental Affairs and
Adjunct Professor of Law

REPORT TO THE GOVERNOR

REVIEW OF THE BP-WHITING REFINERY WASTEWATER PERMIT

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Bloomington, IN 47405
December 3, 2007

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EXECUTIVE SUMMARY

In August, 2007, Governor Daniels asked me to review the state and federal laws governing Great Lakes water quality and the state's process to implement those laws, particularly as they pertain to the issuance of a wastewater treatment permit by the Indiana Department of Environmental Management (IDEM) to British Petroleum's (BP) Whiting facility. The facility sought the new permit in connection with a multi-billion project that would increase the refinery's capacity by 15% and allow it to use as its primary feedstock extra-heavy Canadian crude. The new permit maintains or tightens a number of provisions in the previous permit but does allow BP to increase its discharge of total suspended solids (TSS) and ammonia contained in treated wastewater through a diffuser 3,500 feet from the shoreline of Lake Michigan. After initial press accounts described the permit as authorizing the discharge of sludge into the Lake, there was widespread public criticism of the permit. As the public controversy continued, the Governor, noting that both IDEM and the United States Environmental Protection Agency (EPA) concluded the permit had been legally issued and was fully compliant with the laws and regulations protecting the Great Lakes, asked that a "credible, independent evaluation of the permitting decision" be conducted.

In conducting the review, I focused on what I believed to be the most important steps in the process and on the most important judgments that IDEM made in the course of approving/issuing the permit as well as on the issues that have been raised by persons critical of the permit. This document presents my findings and recommendations as well as the context and rationale for those findings and recommendations.

Worth noting at the outset is that this matter is, in most respects, a fairly straightforward permitting action taken in a regulatory context where the Indiana regime is, in a number of respects, more protective of its Great Lakes waters than adjoining states. Contrary to some of the initial press reports, the permit does not authorize BP to discharge industrial sludge into Lake Michigan and that mischaracterization, unfortunately, contributed to public misperceptions of the permitting decision.

At the core of the controversy in this matter are some gaps and vague aspects of the Indiana regulations for Lake Michigan that implement a concept known as "antidegradation." The concept involves the question of when, and the extent to which, new or increased discharges of pollutants will be permitted so long as the discharge will otherwise meet all legal requirements that protect the quality of the receiving waters and the desired uses for that water. The public, the regulated community, and the regulators have different perceptions/perspectives on what the antidegradation policy is for Lake Michigan and the mechanisms by which is it is, or should be, implemented.

These competing perspectives collided in the instant matter because the regulatory requirements were not as clear as they need to be to serve the legitimate interests of the regulated community, the regulators, and the public. The regulated entity (BP) thought it had a legally issued permit that met the explicit legal requirements and could be relied upon as the company proceeded with the modification of its facility. The regulator

believed that it had issued a legally and technically sound permit—and is unsure of how to deal with what it views as requests for actions outside the current regulatory construct. Many in the public, however, do not understand why an increase was allowed; they believe the Indiana antidegradation process is opaque and the apparent legal standards at odds with their view of antidegradation--and they view with considerable suspicion the asserted basis for allowing the increased discharge.

The major findings from the review are:

- The permitting process for the BP-Whiting refinery that was implemented by IDEM complied with existing regulations and the permit complies with the explicit requirements of state and federal law. If the discharges from the facility are limited to those in the permit, the diffuser works as designed, and the other assumed conditions hold, the wastewater discharge would not be expected to cause a violation of water quality standards or interfere with designated uses in Lake Michigan (including full body contact recreation such as swimming), maintaining the aquatic community, and drinking water supply).

- The limitations in the BP permit are as demanding, and in several instances much more restrictive than, those issued by adjoining states to refineries. The limits on ammonia are much more restrictive, and the total suspended solids (TSS) (small discrete particles that remain suspended in wastewater even after it has been treated) limits more restrictive, than those in the permit for the most comparable refinery on the Great Lakes, which recently was allowed to increase the discharge of those pollutants as it increased its utilization of heavy Canadian crude feedstock.

- EPA reconfirmed that it considers Indiana's antidegradation regulations to be in compliance with EPA's Great Lakes Water Quality Initiative Antidegradation Policy. In fact, with a flat ban on new or increased discharges of bioaccumulative chemicals of concern (BCCs) to Lake Michigan resulting from a deliberate action by a permitee, Indiana is more protective of the Lake than the adjoining states. Indiana has designated all of its waters in Lake Michigan as an "outstanding state resource water" deserving of special protection.

- A number of circumstances unique to this particular re-permitting illuminated certain critical gaps and vague aspects in the Indiana antidegradation regulations for waters of the Great Lakes system. The BP permit was the first permit that IDEM issued under these regulations. Although IDEM, to its credit, sought to compensate for those shortcomings, there was not a clear understanding as to (1) what level of increased discharge would be considered to constitute a significant lowering of water quality and (2) what information BP was to submit. Consequently, the information ultimately submitted on the record by BP fell short of what IDEM initially requested and ideally needed to

make a decision as to whether, and to what extent, the increases should be allowed. As a result, the determination that the increased discharges are "necessary" lacks the factual support in the public record and a clear articulation of the legal standards by which the decision is to be made; both of which are needed in order for the decision to be seen as credible by the public.

- Indiana should clarify its antidegradation regulations for Lake Michigan to make them easier for permit applicants and the public to understand and for the agency to apply. Specifically, the regulations should clearly spell out: (1) when an applicant seeking permission for an increase in its discharge to the Lake must submit an antidegradation demonstration; (2) the required content for such a demonstration; (3) the legal standard by which the adequacy of the demonstration will be evaluated and any increase allowed; and (4) the process by which the public can comment on the demonstration, ideally before the agency makes its decision concerning it in a draft permit.

I have also identified a number of systemic improvements that EPA and the Great Lakes states might consider and have set them out in the Recommendations section of this report.

CHARGE

STATE OF INDIANA
OFFICE OF THE GOVERNOR
State House, Second Floor
Indianapolis, Indiana 46204

Mitchell E. Daniels, Jr.
Governor

August 13, 2007

The Honorable A. James Barnes
Professor, Public and Environmental Affairs
School of Public and Environmental Affairs
Indiana University
1315 East Tenth Street
Bloomington, IN 47405

Dear Jim:

I hope this letter finds you well. I am writing to request your service on behalf of our state. Your talents, experience, and reputation make you ideally suited to an important task at hand, which I will describe in the paragraphs below.

I would like you to lead a review of the state and federal laws governing Great Lakes water quality and the state's process to implement those laws, especially as they pertain to the recent issuance of a wastewater treatment permit by the Indiana Department of Environmental Management (IDEM).

In June, after a lengthy and extensive review, IDEM issued a new permit to British Petroleum's (BP) Whiting facility. While generally more restrictive than previous permits at the site, the new permit does allow BP to increase the amount of total suspended solids and ammonia in treated wastewater 3,500 feet from the shoreline of Lake Michigan. IDEM worked for two years with BP to ensure that the company met all state and federal requirements before awarding the permit, and U.S. EPA approved the permit as fully consistent with current federal water quality laws. Neither IDEM nor EPA believes that the increased discharge will have a deleterious effect on the Lake. Nevertheless, there has been widespread criticism of the permit since its issuance.

The state's standards and permitting process that have been in place since the Bayh Administration in the mid-1990s, are suddenly the subject of skepticism in the media and those without a detailed understanding of environmental laws and science. Although I have full confidence in IDEM's staff and leadership, I believe it is necessary to have a credible, independent evaluation of the permitting decision and outcome. Specifically, I would ask you to:

1. Review the current federal and state laws concerning Great Lakes water quality and permitting, including assessment of whether these laws are sufficiently protective of the Great Lakes system.

2. Assess IDEM's actions to implement those laws in BP's permit, both in the form of discharge limits and other requirements (monitoring, biological testing and assessment, etc.)

3. Evaluate the impact of BP's proposed discharge on Lake Michigan's quality and uses as a source of drinking water, recreation, and aquatic life.

You should feel free to call on other experts to assist you in your work, which I hope you will be able to complete in four to six weeks time.

I hesitated to impose on you, but I believe you are uniquely suited to and qualified for this task. Your knowledge and credibility on environmental issues are beyond question, and your personal integrity beyond reproach.

Thank you very much for considering this request to serve your fellow Hoosiers. I look forward to hearing from you at your earliest convenience.

Sincerely,

Mitch Daniels

REVIEW PROCESS

Pursuant to the Governor's charge, among other things, I: (1) reviewed the publicly available documents concerning the permit and its issuance as well as wide range of other materials; (2) met with IDEM and EPA officials involved in the processing and review of the permit application; (3) met with representatives of several public interest groups who are active in Great Lakes issues and talked with representatives of several industry association whose focus is development in the Great Lakes states; (4) met with representatives of BP; (5) reviewed press reports and other documents to identify issues that have been raised by others concerning the permit; (6) consulted with Dr. Jeffery White, an environmental scientist/engineer in the Indiana University School of Public and Environmental Affairs whose expertise is in water chemistry and wastewater technology; and (7) consulted with several former senior EPA officials to ascertain their judgments as well.

In conducting the review, I focused on what I believed to be the most important steps in the process and on the most critical judgments IDEM and EPA made in the course of approving/issuing the permit—as well as on the issues that have been raised by persons critical of the permit. My goal in submitting the findings and recommendations in the attached report is to present them in a succinct manner that provides the essential context and rationale for those findings and recommendations.

In conducting the review and preparing the report, I am grateful for the able assistance of Lauren Jeffries, who holds a J.D. degree from the University of Michigan and is currently a student in the Masters program in environmental science in the Indiana University School of Public and Environmental Affairs.

CONTEXT FOR THE CONTROVERSY

A. Facility/Permit History

The refinery on Lake Michigan at Whiting, Indiana, was built by John D. Rockefeller in 1889 and for many years was operated by Standard Oil. The Clean Water Act of 1972 required that point sources of pollution obtain permits for discharges of pollutants to "waters of the United States" and that the permits incorporate certain minimum limits on those discharges. The refinery received its first such permit in 1974 and the discharge limits in it were based on the permit writer's "best engineering judgment" as to what control of pollutants was readily achievable by the facility in light of the nature of the facility and the current state of control technology. New permits were issued in 1980, 1985 and 1990. In 1995, the 1990 permit was extended administratively and remained in effect until IDEM issued a new permit in June of 2007. BP amended its initial application for a renewal of the 1990 permit in order to accommodate an increase in the capacity of the refinery and a planned change in primary feedstock to utilize Canadian extra-heavy crude oil.

B. Factors Contributing to the Controversy

At the outset it is useful to identify some of the factors that set the stage for this permit matter to draw widespread public attention and that subsequently fueled the controversy once it began.

- For a number of years, BP has been promoting itself as a "green" company and good environmental steward—and seeking and obtaining a permit that allows a 35% increase in the mass of TSS (total suspended solids) and a 54% increase in the mass of ammonia discharged to Lake Michigan in connection with a 15% increase in capacity appeared inconsistent with that perception/reputation. Oil company profits have been at record levels, and critics thought that some of BP's profit should be directed to protecting Lake Michigan as it undertook a multi-billion dollar modification of its refinery.

- This was the first major permit issued by Indiana in many years for a direct discharge to the Great Lakes, and the first since the EPA Great Lakes Antidegradation Policy was adopted in the 1990s. The permit it replaced had been issued 17 years earlier, in 1990. Interested parties were concerned that the BP permit would set a precedent for how the antidegradation policy would be implemented in other permit actions. In particular, some members of the public and public interest groups were concerned that it appeared there had not been a rigorous search for cost-effective alternatives that might reduce or eliminate the need for those increases; they were also concerned that the information and rationale provided in the public record for the "necessity" for the increases was weak and lacked credibility.

- There is a perception on the part of some members of the public and public interest groups focused on the Lake that the antidegradation policies in place essentially preclude increases in pollution to the Lake from controlled point sources. Noting that one of the goals of the Clean Water Act is to eliminate the discharge of pollutants to the waters of the United States, they also expect that the discharges will be reduced over time. In fact, antidegradation means different things to different interest groups with some believing that any new or increased discharge of a pollutant requires a careful examination of whether the discharge can be avoided or minimized and others believing that new or increased discharges should be permissible without such a showing so long as the discharge will not interfere with existing uses of the water body such as for recreation or as a drinking water source. In reality, the antidegradation policies adopted by states usually fall between these polar positions, and, unfortunately, the regulations written to implement the policies often lack the coherence and clarity that regulated entities, the regulators, and the public need.

- Mercury in Lake Michigan is a serious problem. Fish consumption advisories are in place, in part, because of mercury levels found in fish tissue. Although the permit sets a very stringent limit on the discharge of mercury from the BP refinery, the permit gives BP a five year grace period to meet the discharge limit, during which time sampling/reporting of mercury discharges is required only twice a year. Neither the Fact Sheet that accompanied the permit nor the responses to public comments on the draft permit clearly explain the rationale for these provisions.

- Initial stories in the press mischaracterized the permit action. The headline in the Post-Tribune article on the permit was "BP not required to build treatment plant in Whiting" and the accompanying article made reference to "increases in TSS (sludge)." Similarly, the initial Chicago Tribune article about the permit referenced a significant increase in the dumping of "industrial sludge." In turn, the characterizations were picked up and used by various public officials. The articles created the erroneous impression that the permit action represented a major assault on the well-being of the Lake—and it is understandable why readers concerned about the Lake would be concerned, if not outraged.

- IDEM allowed a mixing zone in Lake Michigan and required the use of a diffuser to dilute a discharge of ammonia and TSS in order to meet the water quality standards Although this is neither the first diffuser nor the first mixing zone approved by either a state or a Canadian Province for the Great Lakes, it was the first approved by Indiana since it initially banned the use of mixing zones in Indiana Lakes for all pollutants except for temperature.[1]

- Beach closings along the Chicago shoreline of Lake Michigan during the 2007 summer for reasons completely unrelated to any discharge from the BP facility heightened public concern about water quality in the Lake.

C. Antidegradation

At the heart of the controversy, from a legal and policy standpoint, is the concept of antidegradation—the question of how much, if any, degradation or deterioration of a given water body will be allowed. Because antidegradation is so pivotal to the debate, a thorough understanding of the concept of antidegradation and the antidegradation policy in the Great Lakes is essential to any discussion of the BP permit.

Historically, antidegradation policies and decisions have been, for understandable reasons, among the most difficult and controversial matters that regulators must deal with and have a close cousin in the prevention of significant deterioration (PSD) decisions under the Clean Air Act. The context is waters whose quality exceeds the quality

[1] In 1994, however, in direct response to a petition from Amoco for relief from this ban for the facility now operated by BP at Whiting, the Indiana legislature created an exemption from the ban allowing Amoco and other facilities on Lake Michigan to employ mixing zones to diffuse pollutants. This amendment is known as the "Amoco Amendment."

required to support a variety of desired usages such as full-body contact recreation in and on the water as well as propagation of game fish, and wildlife. Antidegradation by its very nature involves first determining what level of discharge may cause a significant lowering of water quality and then a balancing of environmental considerations against economic and social considerations. A critical question in antidegradation policy is--how much, if any, deterioration in water quality (while still not going below the established minimum levels) will be allowed in order to obtain certain economic or social benefits?

Many members of the public, the regulated community, and the regulators view this question, and the appropriate answer, through quite different lenses. For some members of the public, antidegradation means no increased discharge as such discharges are always considered to cause deterioration of existing water quality—and these individuals point to the goal of the Clean Water Act to improve water quality over time as new, better controlled sources replace less-well controlled ones or the development of new technologies allows existing sources to meet more restrictive limits. In their view, not only should water quality not be allowed to deteriorate, it should continually improve.

From the regulators' prospective antidegradation usually does not mean a complete ban on all new or increased discharges that may cause deterioration, but rather that some balancing of competing considerations will be required before some limited deterioration will be allowed. EPA does ban any deterioration in outstanding National resource waters. For waters of the Great Lakes system, EPA requires a compelling demonstration that any proposed increases in BCCs cannot be avoided by employing reasonable alternative controls or other changes in operating procedure. For other waters, or for non-BCC pollutants in the Great Lakes system, EPA establishes minimum requirements such as "maintaining and protecting existing water uses" but leaves the decisions largely to the states so long as the minimums are met. That is the instant case.

For the regulated community, be it industry or municipal wastewater treatment plants (POTWs), flowing water has historically been viewed as an appropriate medium for returning properly treated water that has been used by citizens or industrial process. The process does result in the use of the water for disposing of and carrying away waste products that are not, or cannot, be removed by the treatment process employed. From this perspective, antidegradation may mean that increased discharges should be permissible so long as an economic or social justification exists for the increase and the discharge will not cause a violation of water quality standards. For example, a municipality might assert that it is justified in increasing the discharge from its municipally-owned wastewater treatment plant because economic and population growth in the community results in a larger volume of wastewater being treated by the facility. So, municipalities located along the Great Lakes commonly argue that they have no choice but to discharge increased quantities of well-treated wastewater, wastewater that nonetheless carries increased amounts of pollutants like TSS and ammonia into the lakes.

These competing perspectives collided in the instant matter because the regulatory requirements were not as clear as they need to be to serve the legitimate interests of the regulated community, the regulators, and the public. The regulated entity (BP) thought it had a legally issued permit that met the explicit legal requirements and could be relied upon as the company proceeded with the modification of its facility. The regulator (IDEM) believed that it had issued a legally and technically sound permit—and is unsure of how to deal with what it views as requests for actions outside the current regulatory construct. And, many in the public do not understand why an increase was allowed; they believe the Indiana antidegradation process is opaque and the apparent legal standards at odds with their view of antidegradation. As a result, they view the asserted basis for allowing the increased discharge with considerable suspicion.

The current situation illustrates the pitfalls that accompany a less than clear set of regulations. While parsing through competing interests and considerations to craft a clear set of antidegradation requirements is challenging work by any means, the benefits are tangible. Once explicit regulations that are clear to all are in place, the regulated community knows what it has to submit and the basis on which the decision will be made, the regulator knows the information it will get to work with and the decision standard it will employ, and the public will see the same information that the agency has before it and have an opportunity to participate in a transparent process. From my perspective, this is the most compelling lesson from this review.

D. History and Current State of Antidegradation Regulation for Lake Michigan

The Clean Water Act and the EPA regulations require that each state provide antidegradation protection as part of the state's water quality standards. States are required to develop and adopt a statewide antidegradation policy and to identify the methods for implementing the policy. For waters in which the water quality exceeds the water quality standards (referred to as Tier II waters), states are expected to "maintain and protect" those levels unless the state finds that allowing lower water quality is "necessary" to "accommodate important economic or social development." High quality waters constituting an Outstanding National Resource (Tier III waters) must be protected and maintained without any degradation. Waters designated by states as Outstanding State Resource Waters (OSRW), like the Indiana portion of Lake Michigan, are regarded as meriting protection somewhere between Tier II and Tier III waters—and are sometimes referred to as "Tier II.5" waters.

In the 1990s, pursuant to the Great Lakes Water Quality Initiative, EPA promulgated a set of requirements specific to the Great Lakes. The regulations set out an antidegradation policy as well as antidegradation implementation procedures, including detailed requirements for an "antidegradation demonstration." The requirements are triggered when any action or activity is anticipated to result in a new or increased loading of bioaccumulative chemicals of concern (BCCs). BCCs include metals such as mercury and organic compounds like PCBs. The EPA Great Lakes antidegradation policy <u>does not</u> apply to anticipated increases in conventional pollutants such as TSS (total suspended

solids) or to ammonia (which are the pollutants at issue in the BP-Whiting permit). EPA requires states to promulgate regulations to implement the EPA antidegradation policy.

Indiana has adopted two sets of regulations to implement its antidegradation policy for Great Lakes waters. Inconsistencies between the two sets are central to the controversy in this matter.

One set of Indiana antidegradation regulations (327 IAC 5-2-11.3) applies in high value state waters that are part of the Great Lakes system but have not been designated as OSRW (outstanding state resource water). An existing discharger proposing to significantly lower water quality in a high-value water must submit an "antidegradation demonstration" to the commissioner that, among other things, identifies measures available to the discharger to minimize or prevent the proposed lowering of water quality including (1) alternative or enhanced treatment techniques that are available that would eliminate or significantly reduce the extent to which the loading results in a significant lowering of water quality, (2) the pollution reduction benefits associated with such techniques, and (3) their costs relative to the cost of treatment necessary to achieve applicable effluent limitations.

The set of Indiana regulations that implement the antidegradation policy in OSRW waters in Lake Michigan (327 IAC 5-2-11.7) does not contain a parallel provision indicating the circumstances in which an antidegradation demonstration is required and setting out the required content for such a demonstration.[2]

Nevertheless, EPA has determined that the water quality standards and antidegradation policies that have been adopted by Indiana for waters in Lake Michigan that have been designated as OSRW are consistent with the Great Lakes Water Quality Guidance promulgated by EPA in 1995. The EPA position is that an antidegradation demonstration is only required under that guidance when a permit applicant proposes to increase its discharge of BCCs to waters of the Great Lakes system; because Indiana bars approval of increases in BCCs, it is not required by federal law to provide for such a demonstration for other pollutants.

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[2] Senate Enrolled Act No. 431 (2000) that amends the Indiana Code, among other things: (1) defines "degradation" with respect to a NPDES permit as meaning with respect to an outstanding state resource water "any new or increased discharge of a pollutant or pollutant parameter that results in a significant lowering of water quality for that pollutant or parameter" unless it results in "an overall improvement in the outstanding state resource water" and meets certain other requirements; (2) requires that the state regulations "prevent degradation" but allow for increased discharges when under the exception noted where the activity results in an overall improvement; (3) requires that the procedures include "a definition of significant lowering of water quality that includes a de minimis quantity of additional pollutant load: (A) for which a new or increased permit limit is required and (B) below which antidegradation implementation procedures do not apply; (4) appears to allow, in certain instances, significant lowering of water quality in an outstanding state resource water upon payment of a fee not to exceed $500,000 for deposit in the outstanding state resource water improvement fund; and (5) requires that all waters designated as outstanding state resource waters shall be maintained and protected in their current quality in accordance with the basic Indiana antidegradation regulations in 327 IAC 2-1 2. These provisions from Senate Enrolled Act 431 are incorporated in IC 13-18-3-2.

Notably, Indiana's antidegradation regulations for Lake Michigan are tougher than required as they do prohibit approval of any new or increased discharge of BCCs attributable to a deliberate act by a permitee. By way of contrast, Illinois, Michigan and Wisconsin do not employ a flat ban on new or increased discharges of BCCs; rather these states just closely examine/ tightly restrict any proposed increases in BCCs.

Indiana also appears to be the only state that has designated all of its open waters in Lake Michigan as "outstanding state resource waters" (Tier II.5), thus indicating that it accords them a higher level of protection than that given to high-value waters (Tier II).

Illinois has a provision in its regulations for "outstanding resource waters" but appears to deal with its Great Lakes system waters as "high quality" waters, a lower category.

Michigan has designated its waters in the Lake Superior Basin as "outstanding international resource water" but appears to address its Lake Michigan basin waters as high value waters, generally, and designates only specified bays and other areas as OSRWs.

Wisconsin has designated a number of tributaries that are national wild and scenic rivers as "outstanding resource waters" (Tier III) and other high-value tributaries as "exceptional resource waters." It appears to assign its Great Lakes system waters some additional protections in addition to those accorded its exceptional resource waters.

The Illinois antidegradation regulations applicable to the Great Lakes contain both specific regulations that apply when there is a proposal to increase the discharge of BCCs and general antidegradation regulations. For permit applicants seeking a new or increased allowance to discharge BCCs into the Lake Michigan basin, an antidegradation demonstration is required along with a pollutant minimization plan. For proposed increases in pollutant loadings to high quality waters, Illinois requires, among other things, (1) that the water be maintained in its present high quality unless the lowering of water quality is necessary to accommodate important economic or social development, (2) that an antidegradation assessment be completed and the permitting agency produce a written analysis of the assessment, and (3) that "all technically and economically reasonable measures" to avoid or minimize the extent of the proposed additional loading be incorporated into the proposed activity.

Michigan's requirements for considering proposed increases in BCCs to Lake Michigan are similar to Illinois's and EPA's. For potential increases in non-BCC pollutants, Michigan focuses on the social and economic benefits and does not appear to explicitly require information on reasonably available alternatives to prevent or control such increases.

Wisconsin's antidegradation rules establish different rules for various categories of waters: (1) outstanding resource waters (national wild and scenic rivers and certain lakes where no degradation is permitted); (2) exceptional resource waters (high value-

fisheries, natural and recreation areas not significantly impacted by human activity); (3) Great Lakes system waters; and (4) fish and aquatic resource waters. Proposed increases in BCC's are addressed consistently with the EPA Great Lakes antidegradation policy, and for other purposes the Great Lakes system waters and the fish and aquatic resource waters (which appear to include Wisconsin's waters in Lake Michigan) are treated similarly. For those waters, an initial question is whether a proposed increased discharge in non-BCC pollutants would result in "significant lowering of water quality." Distinctions are then made between municipal wastewater treatment plants and other facilities. Non-wastewater treatment plant dischargers whose increase would "significantly lower water quality" must meet limits based on "demonstrated, cost-effective pollution control alternatives" that would prevent the significant lowering of water quality.

Given the differences in the approaches the four states take in their antidegradation regulations as they apply to their Lake Michigan waters, it is not difficult to conclude that on the same set of facts with an industrial or municipal facility requesting an increase in its discharge to Lake Michigan, you would have four different sets of antidegradation requirements and four different processes to implement those requirements--and could have four different outcomes dependent on the state with jurisdiction to issue the permit.

FINDINGS AND CONCLUSIONS

The following findings and conclusions are organized around the major questions I identified as pertinent to my investigation; in each case below, the findings and conclusions follow the questions.

I. Will the permitted discharge adversely affect the quality of Lake Michigan and its use as a source of drinking water, recreation, and aquatic life?

A. If the discharges from the BP facility are limited to those in the permit, the diffuser works as designed, and the other assumed conditions hold, concentrations of pollutants in excess of the water quality standards—which are designed to be fully protective of the designated uses of full-body contact recreation and maintaining a well-balanced warm water aquatic community—in the water column at the edge of the mixing zone 3,500 feet from the shoreline are highly unlikely.

B. Compliance with water quality standards for water to be used for drinking water is measured at the intake for the public water supply; in this instance there is no intake in the immediate the vicinity of the main outfall and no reasonable basis for concluding that the permitted discharge would pose a problem for drinking water taken from Lake Michigan.

C. The increases allowed under the 2007 permit in the discharge of ammonia and TSS, which attracted much of the public attention, should not in and of themselves pose a problem for the designated uses, given the very substantial dilution that will take place at the point of discharge. The concentrations of ammonia and TSS permitted in the BP permit are very similar to the concentrations allowed in permits for discharges from publicly owned sewage treatment plants for medium-size cities.

Potential for immediate toxicity to fish is the primary concern with increased discharges of ammonia; this concern should be obviated by the very substantial dilution (37.1 to 1). While nitrogen can also contribute to the growth of algae, phosphorus, rather than nitrogen, is the major nutrient of concern in the Great Lakes and the level of nitrogen involved here at a location well out in the Lake should not be a significant concern.

Because TSS may include tiny particles not easily removed from the wastewater of contaminants such as metals (mercury, chromium, or vanadium) that are in the suspended solids that ultimately fall out of the water column, the possibility that these may become biologically available while on or in the sediment, and bioaccumulate / biomagnify as they make their way up the food chain is also a concern. EPA's Great Lakes BCC policy addresses those pollutants it considers to pose a problem for the Lake and IDEM's regulations preclude approval of an increase in BCCs. Here, even though an increase in TSS is authorized, the 2007 permit *holds constant* the current limits on metals such as chromium so they are not allowed to increase and *establishes a very stringent level* for mercury near the level of detection.

The question of the extent to which any increase in TSS or ammonia should be allowed is a fair one and at the heart of this controversy. However, the concentration of TSS permitted per liter of water (the equivalent of 10 grains of sand suspended in a pint of pure water) illustrates how far the description of it in several newspaper reports as "sludge" is from reality. In fact, industrial sludge—such as the material that accumulates at the bottom of wastewater treatment tanks--cannot legally be dumped into Lake Michigan or disposed of in a manner where it will reach Lake Michigan.

Similarly, the permitted ammonia concentration is the equivalent of one eye-dropper drop of household ammonia solution in a pint of water. Thus, some public perceptions/reactions were not based on an accurate understanding of the true facts.

II. How do the discharge limitations in the permit IDEM issued to BP-Whiting compare to those in permits issued to refineries by other states?

As part of the review, I obtained some permits that have been issued by other states to major refineries and have compared the effective effluent limits in those permits to those imposed by IDEM in the BP-Whiting permit. This is a challenging task where precise comparisons are not possible because the refineries have different throughputs, different wastewater volumes, utilize feed stocks with different qualities that effect the ease with the process water can be treated and utilize different

processes to produce different products. Also, storm water may be mixed with process water, and the limits may be expressed in different ways. Because the BP-Whiting refinery will be processing a feedstock--the extra-heavy heavy Canadian crude—that is at the high end of difficulty in dealing with the waste products in the process water, one can make some rough comparisons with other refineries with a reasonable degree of confidence.

The effluent limits for TSS and ammonia in the BP-Whiting permit appear to be significantly more stringent than the respective limit for ammonia and more stringent than the TSS limit in the permit issued in 2004 by Ohio to BP-Toledo. Those limits are based on that refinery's processing of the extra-heavy Canadian crude. The BP-Toledo permit resulted in an increased discharge of a number of pollutants, including TSS and ammonia, to Maumee Bay on Lake Erie. The increase was authorized following an "antidegradation review" based on a "letter" submitted by the permit applicant. The Fact Sheet accompanying the 2004 BP-Toledo permit does not provide specifics. The permit appears to require that mercury discharges be monitored and reported but does not establish limits for mercury discharges, even though it discharges mercury to a Great Lake.

The limits for ammonia in the BP-Whiting permit appear to be considerably more stringent than the limits for ammonia in the 2007 permit issued by Illinois to Conoco Phillips for its Roxana, IL (Wood River) facility and are similar to or marginally more restrictive than those for TSS in that permit. That permit does not contain a mercury limit. That facility discharges to the Mississippi River system. Illinois has published an antidegradation review of the request to increase certain pollutants to the Mississippi River as part of a modification to the facility that would increase capacity, improve some wastewater treatment, and also allow the processing of the extra-heavy Canadian crude. The 2006 Memorandum summarizing the antidegradation assessment notes the purpose and anticipated benefits of the proposed modification and concludes that the increased pollutants discharged will "quickly be diluted to below the water quality standard" due to the abundant dilution in the Mississippi River.

The BP-Whiting permit limits for ammonia and TSS were also more stringent than the limits in refinery permits from Texas, Louisiana and California that I examined.

The TSS and ammonia limits in the BP-Whiting permit appear quite comparable to limits in the Mobil Oil-Joliet and Citgo-Lemont refinery permits issued by Illinois. Neither of those permits had mercury limits. However, the relatively smaller size of these facilities and the nature of the refining operations would be expected to present a less challenging wastewater control problem than the refining operations at the BP-Whiting facility when it processes the extra-heavy Canadian crude.

Both the TSS and ammonia limits in the BP permit appear less stringent than those in one current refinery permit issued by Wisconsin (Murphy Oil). The limits in that permit are based on the water quality standards for Newton Creek. Mercury is required to be sampled and reported, but no limit for it is established in the permit. It is difficult to draw definitive conclusions about whether the control technologies and processes employed at that facility might be adopted by BP-Whiting without more knowledge about the nature of the crude being refined at that facility in light of the significant implications that element has for treatment options and attainment of discharge limits.

The ammonia and TSS limits in the BP-Whiting permit are more stringent than the limits in Marathon Oil's industrial discharge permit issued by the City of Detroit. Marathon Oil discharges its wastewater to the City of Detroit's treatment plant and is subject to pretreatment requirements. The City further treats the refinery wastes along with wastes from other sources and discharges the treated wastewater to the Detroit River. A direct comparison with the BP-Whiting permit is difficult to make because the Marathon refinery wastes are diluted and further treated as they are combined with wastewater from other sources before the wastewater is discharged from the city's wastewater treatment plant to the Great Lakes system.

Overall, the BP-Whiting permit limits compare favorably to the respective limits in permits issued by adjoining states—and to permits issued elsewhere in the country--and this comparison supports IDEM's contention that the limits in the BP-Whiting permit for TSS and ammonia are as, or more, stringent than are required by EPA's technology-based effluent limitation guidelines which apply to all refineries wherever located in the country. Two of Indiana's neighbors (Illinois and Ohio) also concluded that it was "necessary" to allow the increased levels of certain pollutants in treated wastewater to be discharged when the refinery in their respective states modified the facility to accommodate increased use of the extra-heavy Canadian crude.

III. Was the permit issued in compliance with applicable state and federal law?

A. Did IDEM follow the appropriate procedure in issuing the permit?

The process used by IDEM in this matter is consistent with the process normally followed in issuing wastewater discharge permits under the Clean Water Act. IDEM provided advance notice to EPA that it would be considering the permit renewal and modification, encouraged BP to meet with interested parties in Northwest Indiana early in the process, notified the adjacent states that it was considering the permit, provided public notice/opportunity to comment on the draft permit before it was issued, and secured EPA's sign-off on the permit.

However, my review identified some shortcomings in the IDEM regulations that implement the antidegradation policy for waters in the Great Lakes system that have been designated by Indiana as an outstanding state resource water (OSRW) as well as

a lack of policy guidance concerning those regulations. The BP permit was the first permit considered under these regulations, and these regulatory shortcomings are at the heart of the controversy that evolved in this matter.

As noted above, the starting point for this issue is a requirement in federal law and regulations that states have antidegradation provisions in their state water quality standards designed to "protect and maintain" current water quality, except in limited circumstances where allowing some degradation is "necessary" to accommodate important economic and social development. Indiana has such provisions as well as separate regulations that implement this policy.

One set of Indiana antidegradation regulations (327 IAC 5-2-11.3) applies in high-value state waters that are part of the Great Lakes system but have not been designated as OSRW. An existing discharger proposing to significantly lower water quality in a high-value water must submit an "antidegradation demonstration" to the commissioner that, among other things, identifies measures available to the discharger to minimize or prevent the proposed lowering of water quality including (1) alternative or enhanced treatment techniques that are available that would eliminate or significantly reduce the extent to which the loading results in a significant lowering of water quality, (2) the pollution reduction benefits associated with such techniques, and (3) their costs relative to the cost of treatment necessary to achieve applicable effluent limitations.

In contrast, the set of Indiana regulations that implement the antidegradation policy in OSRW waters in Lake Michigan (327 IAC 5-2-11.7) do not contain a parallel provision. These regulations do not clearly state what would constitute a "significant lowering of water quality" for OSRW where a case-by-case determination of limits is requested in connection with a request to increase a discharge. They also do not specify when an antidegradation demonstration is required and if so, what it should contain.

IDEM, to its credit, addressed the gap in the regulations on an ad hoc basis and required that BP submit an "antidegradation analysis." However, BP, as it noted in its submission to IDEM, believed it had insufficient guidance in the regulations as to what needed to be in that submission. As a result, the sufficiency of the BP submission is at issue. This is discussed in the next section of the report.

This review also identified a public perception of some possible problems with the notice provided to the members of the public who submitted comments in this matter as well as some potential improvements in the process that could enhance the decision making and increase public confidence in the ultimate decisions. These are addressed in the Recommendations section of the report.

B. Does the permit, as issued, comply with existing state and federal law?

The 2007 permit issued by IDEM to BP-Whiting conforms to the explicit substantive requirements imposed by federal and state law that are designed to protect the water quality in Lake Michigan. The effluent limitations in the permit are as, or more, restrictive than the minimum technology-based effluent limitation guidelines promulgated by EPA. A modeling demonstration reviewed by IDEM and EPA shows that discharges of pollutants at the levels allowed in the permit should not cause a violation of the water quality standards for the portion of Lake Michigan in which the discharge will take place.

The comfort level with the fact the discharges are required to be within the current minimum technology-based effluent limitations established by EPA has to be tempered a bit—in both directions. The EPA guidelines are more than 20 years old and need to be reviewed again by the agency to assure they reflect a current assessment of what effluent limits are achievable using cost-effective treatment reasonably available on a retrofit basis. On the other hand, it is not clear that the existing limitations fully account for the difficulty of treating the much heavier Canadian crude oil that will be processed at this and other facilities in the Great Lakes states. States should have the benefit of a current technology assessment as they set minimum effluent limits in permits.

The core of the controversy that developed in this matter is not whether the effluent limitations and water quality standards are met, but rather whether BP should be allowed to discharge any increased quantities of TSS and ammonia to Lake Michigan even if those discharges are consistent with the current legal requirements and do not interfere with the desired uses of the Lake. Thus, at issue, are the antidegradation provisions applicable to waters that have been designated as OSRW.

BP amended its initial permit renewal application to request that IDEM establish permit limits on a case-by-case basis under a provision in Indiana law that allows increases in the mass of certain pollutants (non-bioaccummulating chemicals of concern) discharged to Lake Michigan so long as: (1) the increase is not due to an increase in the discharge flow: and (2) water quality standards are met, including through the use of a special mixing zone. The limits in such a situation are authorized to be set on a case-by-case basis. 327 IAC 5-2-11.7(a)(1)(B)(iv).

This was the first such application received by IDEM—and consistent with IDEM's current goal of reviewing all administratively expired permits IDEM was under some considerable pressure to render a decision on the permit application both to replace a 17 year-old permit and to allow BP to move forward with its reconfiguration of the refinery to utilize the Canadian heavy crude feedstock. Faced with the inconsistent and incomplete antidegradation implementation regulations noted above, IDEM crafted a reasonable set of process measures and substantive standards to govern this case using provisions drawn from the two sets of antidegradation implementation regulations.

That the information that IDEM required appears to be more demanding than the information the state of Ohio required in allowing an increased discharge of TSS and ammonia to a refinery located on Lake Erie merits acknowledgment. The Michigan regulations do not appear to require that in a similar situation, an applicant seeking to increase discharges of these (non-BCC) pollutants would have to submit information concerning alternatives that might minimize or eliminate the need for the increase. The Illinois regulations appear to require something quite similar to what IDEM required (see next section).

1. The Antidegradation Demonstration.

IDEM required that BP submit an "antidegradation analysis" to serve as a basis for making the case-by-case decision for increased monthly mass discharge limitations. Even though not explicitly required by the subsection 11.7 regulations, this appears sound as a matter of policy so that the determination would be approached in a manner consistent with the general principles of antidegradation that the regulations seek to implement; it also is consistent with the approach IDEM has taken in the subsection 11.3 implementing regulations for high-value, but non-OSRW, waters in the Great Lakes system.

One would expect that the antidegradation demonstration required for the Tier II.5 (OSRW) waters would be at least as stringent, if not more stringent, than that required for the Tier II (high-value/non –OSRW) waters.

IDEM advised BP it would require, among other things, the following information in an "Antidegradation Application to Implement 327 IAC 5-2-11.7(a)(1)(B)(iv)"—the subsection in the Indiana regulations that allows the limits for certain discharges to OSRW to be established on a case-by-case basis:

8. An identification of measures available to the applicant to minimize or prevent the proposed lowering of water quality. A separate analysis shall be performed for each pollutant or pollutant parameter for which there is an increase in the loading to the receiving stream. Each analysis shall include the following:
    (A) An analysis of:
        (i) pollution prevention alternatives and techniques and treatment technologies and techniques, including:
        (AA) new and innovative technologies; and
        (BB) methods or practices to avoid the new or increased discharge available to the applicant that would minimize or prevent the proposed lowering of water quality;
        (CC) water use or recycle
        (ii) the mass loadings and effluent concentrations attainable by the alternatives and techniques; and
        (iii) the costs of each alternative

Non-Discharge alternatives consideration and evaluation includes:

- land application systems including spray irrigation and subsurface alternative systems
- alternative discharge locations
- discharging to other existing treatment facilities
- the costs of each alternative.

Discharge Minimization and Pollution Prevention consideration and evaluation:

- wastewater minimization technologies (i.e. water recycle or reuse)
- advanced treatment
- reduction in the scale of the project or water conservation practices which may make a non-discharge alternative like land disposal more feasible
- pollution prevention measures.

If no viable non-discharge or minimization alternatives are identified, a review of available end-of-pipe treatment scenarios must be conducted.

> (B) Analysis of end-of-pipe scenarios:
>
> A prefatory assessment of available end-of-pipe treatment methods can be done to eliminate those which are technically infeasible or environmentally unsound and reduce the number of scenarios requiring rigorous analysis. The reasoning behind eliminating treatment scenarios in such prefatory assessment should be clearly documented to assure that the study is technically sound.
>
> The results of the end-of-pipe treatment review should be presented as follows:
>
> All end-of-pipe scenarios determined to be viable should also be ranked in terms of cost of the alternative or enhanced treatment techniques relative to the expected discharge levels. Include the treatment/disposal systems evaluated, including the costs associated with the equipment, installation, and continued operation and maintenance. Express the expected discharge levels on a daily maximum and monthly average basis.

The "Antidegradation Analysis" submitted on behalf of BP noted that an "alternatives analysis" is not specifically required under subsection 327 IAC 5-2-11.7(a)(1)(B)(iv). The document then goes on to indicate the kinds of measures such an analysis might include (largely embodying the elements set out by IDEM) and then states: "Because BP Whiting is an existing discharger, the Pollution Prevention, Non-Discharge, Discharge Minimization and Pollution Prevention Alternative

Evaluation do not apply. BP therefore focused on an evaluation of treatment scenarios."

BP is correct in asserting that the Indiana regulations do not specifically call for the submission of an antidegradation demonstration or analysis in connection with the case-by-case determination of effluent limits they were seeking: the regulations clearly have a void in that regard. In applying basic antidegradation principles, however, IDEM did ask for such an analysis and provided some relatively specific guidance as to what it should contain.

There are counter arguments to BP's position that as an existing discharger, it need only assess treatment scenarios. I assume BP's position is based on the normal practice in developing water and air pollution control regulations for existing dischargers to focus on end-of-pipe controls that can be added to a facility while new facilities can/should also be required to consider additional up-stream mechanisms for minimizing discharges as they design the facility. The counter arguments to BP's position include: (1) IDEM specifically asked for analysis of alternatives beyond end-of-pipe treatment scenarios and (2) the time when an existing facility is undertaking a major multi-billion dollar upgrade, including changes in its process to accommodate a different feedstock and increasing its capacity, is an ideal time to examine alternatives (beyond end-of-pipe controls) that might be engineered into the project to reduce pollutants that ultimately will discharged in the wastewater.

The antidegradation demonstration submitted by BP to IDEM fell short of what IDEM required and short of what ideally would be submitted. Essentially, the report for BP devoted: (1) one-half page to a listing of changes to the facility with an estimated cost of $90M that will enable it to meet the existing limits for COD (chemical oxygen demand), O & G (oil and grease), sulfide and hexavalent chromium (AD Analysis, page 5-6); (2) one paragraph to possible controls for further controlling TSS, rejecting one possible alternative because, among other things, it would concentrate the metals like mercury and vanadium and result in increased "solid waste disposal;" and (3) one paragraph to ammonia removal, noting that an expenditure of $37M would increase the removal through the use of a sour water stripper, and rejecting "primarily" on feasibility grounds other possible controls like those used at other BP facilities because they become unreliable because of corrosion.

With this limited information it is difficult, indeed almost impossible, for a reviewer or the public to know whether the rejection of the alternative is reasonable. For example, what is the timeframe over which the deterioration becomes a problem and what are the capital/operating costs relative to the environmental improvement the controls provide? The conclusions may be correct. IDEM, however, indicated that "the reasoning behind eliminating treatment scenarios in such prefatory assessment should be clearly documented to assure that the study is technically sound."

IDEM appeared to realize that the initial submission it received from BP provided information inadequate on which to base a decision as to the "necessity" for the proposed increased discharge. IDEM required BP to submit an "addendum" re ammonia removal which BP did in November 2006. However, even the revised submission fell short.

A 2 ½ page "Addendum"—entitled "Evaluation of Ammonia-N Mass Discharge After Refinery Reconfiguration and Use of CXHO" was prepared and submitted to IDEM on November 30, 2006. The document began by noting that "the Lakefront WWTP is not specifically designed to degrade (nitrify) ammonia but that conditions in the tanks are now effective in degrading ammonia." The consultant then recalculated the mass of ammonia that the plant will need to discharge after it is reconfigured.

A single paragraph at the end of the document entitled "Lakefront WWTP Options to Attain Current Ammonia-N Discharge Limits" indicates that a "technically feasible treatment" could further reduce ammonia-N to achieve a 1,030 lb/day monthly average. It would require two additional treatment tanks that with the additional piping, pumps and equipment would require 12,000 square feet. The document then states that space is not available at the Lakefront WWTP and that placing the tanks separate of the lakefront would make the option "extremely expensive, if not infeasible." On the ground that space "is not available at the Lakefront," the report concludes that "it is not appropriate to develop capital and operational costs."

However, IDEM very specifically asked that cost information be provided for "viable" options and that the cost information should include the costs associated with the equipment, installation, and continued operation and maintenance." IDEM also asked for expected discharge levels from the use of the alternative technology. This information would have allowed IDEM, and the public, to see whether it was reasonable to ask the company to utilize the alternative in light of the environmental benefits produced relative to the costs that would be entailed.

The shortcomings in the antidegradation demonstration raised questions in the public's mind as to whether there had been sufficient inquiry/effort to avoid the increased discharge to Lake Michigan. Concomitantly, a more fulsome submission would have contributed to a better decision record that, in turn, would have more easily commanded public understanding and acceptance.

The subsequent study prepared by Tetra-Tech for the City of Chicago suggested that a more wide-ranging review of the technical literature and practices at other refineries might yield additional control technologies that warranted consideration by BP; but that possibility needs to await the results of the study BP commissioned Purdue-Calumet and Argonne National Laboratory to perform.

2. The "Necessity" Decision.

The current IDEM regulations for waters designated OSRW do not provide a clear statement as to the considerations IDEM has to take into account in making the case-by-case determination on the request to increase the discharge of TSS and ammonia. IDEM, to its credit, tried to make sense out of an inadequate set of regulations and crafted an ad hoc set of requirements to govern the permitting decision in this case that were consistent with sound antidegradation policy.

IDEM indicated that the "antidegradation analysis" BP was to conduct was for the purpose of evaluating "the social and economic benefits, alternate wastewater treatment, and expected effluent quality after the refinery was reconfigured to process the CXHO." IDEM stated that BP would have to "demonstrate that all economically and technically feasible measures have been taken to avoid the action that will result in a new or increased discharge of a pollutant or pollutant parameter and that it is not feasible to limit the new or increased discharge to a temporary period. BP North America must demonstrate that any increase in pollutant loading is necessary." (emphasis added)

The subsequent substantive determination that the increased BP discharge is "necessary" can fairly be questioned, in part because of the limited information available to IDEM in the public record. The determination that the discharge is necessary might well be upheld by a reviewing court because (1) the requirements are not clearly spelled out in the regulations and (2) a court will normally provide some presumption in favor of an agency in interpreting and applying its own rules and not overturn such a determination unless it is 'arbitrary and capricious." And, it might well be the case that added controls are not available at a reasonable cost and that, based on additional information demonstrating that conclusion, the "necessity" decision would stand.

However, because of evidentiary weaknesses and inconsistencies in the existing record, a strong contrary case can be made that BP had not demonstrated the necessity of the increase. In particular, the determinations that some further controls were not feasible because of "limited space" or because other process changes would create a "solid waste" problem lack credibility—and clearly did not pass muster in the court of public opinion. Further, subsequent events (I understand that use of the sludge incinerator has been discontinued and is being dismantled) would remove the offered reason for rejecting the suggestion by a public commenter that the sludge incinerator site be used for the additional wastewater treatment that the consultant had identified as a technically feasible additional treatment step.

3. Mixing Zone/Diffuser.

A mixing zone is a regulatory artifice that allows a limited area in a receiving water to be used for discharges of pollutants to be diluted by the receiving waters before determining whether or not the discharge will cause a violation of water

quality standards in the vicinity of the discharge. Mixing zones are commonly provided for discharges of pollutants to streams and rivers where the current/flow will rapidly dissipate the discharge. Mixing zones are not normally provided in lakes where the same sort of current action is not present.

Indiana law does allow the use of a mixing zone in Lake Michigan for the purpose of determining whether the discharge of some pollutants such as TSS and ammonia will cause a violation of water quality standards. In the instant case, IDEM required that BP utilize a "diffuser" located on the Lake floor that, in combination with the currents present 3,500 feet out in the Lake, would rapidly dilute the discharge that includes TSS and ammonia. A mathematical model was then used to determine that the discharge would be diluted at a ratio of 37.1 to 1 in the effective mixing zone.

Some critics of the BP permit action have questioned whether the state should allow the use of the diffuser and the mixing zone. EPA indicated that other diffusers and mixing zones have been permitted in the Great Lakes, I believe, for municipalities in connection with their discharges of TSS and ammonia from their wastewater treatment plants. A discharge at the maximum levels in the BP permit through the current near-shore outfall (001) with no diffuser might cause a violation of water quality standards in the vicinity of the discharge; concomitantly, if the permitted discharge comes through the diffuser it would not be expected to cause a violation of water quality standards at that location in the Lake. It also would be much less likely to be toxic to organisms in the area of the discharge.

4. Mercury.

Critics of the BP permit also raised questions about the provisions in the permit pertaining to mercury. The very stringent concentration limit established for mercury in the permit is legally correct and the provision giving BP five years to meet those limits is clearly allowed by federal and state laws and regulations. However, no rationale is set forth in the public record for the five-year grace period, and the agency's response to public comments concerning the handling of mercury is in some instances not reflective of sound environmental policy.

Given the level of concern about mercury in waters of the Great Lakes, the fact that the mercury standard has been in place since 1997, and the fact a fish consumption advisory is in place due in part to mercury levels in fish—it is desirable that the agency better explain its rationale for its decisions concerning mercury. I believe there may well be good reasons for allowing the five years (a number of which are noted below); it would assist public understanding if they were clearly set forth in the record.

The concentration limit for mercury in Great Lakes waters is a very stringent one close to the level of detection; indeed, it is lower than the amount of mercury permitted in our drinking water. The standard is almost universally acknowledged to be difficult if not impossible to meet on a consistent basis by industrial firms or

municipal waste treatment plants (POTWs) that have mercury in their effluent—and in some case the process water taken into the facility to use in the facility may have levels of mercury that exceed the legally allowable levels. These firms and municipal wastewater streams are usually not the major or even significant contributor to mercury levels in the lakes—most of it comes via airborne deposition. Accordingly, it is common to provide a variance from the legal limit for certain industrial permit holders like the BP refinery as well as POTWs after they prepare an assessment of the mercury in their waste stream and develop—and implement—a plan to minimize or prevent (PMPP) the presence of mercury in their waste stream.

A commenter (Comment 43) suggested the desirability of doing a mass balance for mercury at the BP-Whiting refinery to minimize the discharge of mercury to the environment; he also asked for a PMPP to be developed. The ideas were rejected with a very limited explanation that did not include an explanation of the historically unsuccessful attempts by major industrial facilities to conduct mass balances on trace contaminants including mercury that are often present in insignificant quantities when the concentrations are below the levels of detection. It is often only after these substances are concentrated in pollution control systems that they become detectable by even sophisticated analytical methods.

Similarly, another commenter (Comment 64) on the proposed permit urged an aggressive process to reduce mercury in the wastewater but indicated a concern that BP would be seeking a variance to be able to incinerate the mercury containing sludge which would release the mercury from the wastewater into the air from which some of it eventually would be deposited into Lake Michigan. The IDEM response to the comment indicates "BP has a permit to operate a hazardous waste incinerator and the NPDES program does not have the authority to demand that BP stop incinerating the sludge" without pointing out that mercury air emissions would be evaluated when IDEM considers BP's proposal for a modification to its air emission permit. While the current state and federal environmental regulatory system which considers environmental media (air, water and land) separately does consider cross-media impacts, this consideration is not transparent to the public, especially when only one permit decision is available for public review at any given time. Sound environmental policy would take a more holistic view of mercury control. My understanding is that BP has voluntarily closed the sludge incinerator and may be in the process of dismantling it.

While the NPDES permit revision has been issued and is no longer subject to appeal, I believe it is desirable that IDEM provide an explanation for its decisions concerning mercury, particularly the 5-year period given the refinery to meet the mercury standard, the twice a year monitoring and reporting requirement, and why the PPMP is not desirable/viable at this time. As noted, there are a number of reasons that might be set forth—and that could be accepted as reasonable—but the public needs to be advised of the rationale IDEM is relying on to support its approach.

5. Monitoring and reporting requirements.

Some commenters raised questions about some of the monitoring and reporting requirements, particularly those relating to possible acute or chronic toxicity in the area of the diffuser. The provisions are within the discretion the agency has to establish such limits. However, it might be desirable for the agency to provide some further explanation as to why it did not believe more frequent or comprehensive testing was necessary or desirable.

RECOMMENDATIONS

Initially, I would note that this case does not indicate there are significant shortcomings in the substantive laws and regulations that are in place to protect the Great Lakes. However, there are a number of steps to address systemic issues that might, or should, be taken by EPA, Indiana, and/or the other Great Lakes States who have a shared interest in and responsibility for the health and well-being of the Great Lakes. These include:

1. Indiana needs to revise its subsection 11.7 implementing regulations for the antidegradation provisions applicable to waters designated as outstanding state resource waters to make them easier for permit applicants and the public to understand and for the agency to apply. Specifically, IDEM needs to revise the regulations for OSRW to clarify (1) when an antidegradation demonstration must be submitted by an applicant seeking permission for an increase in its discharge to the Lake, (2) the required content for such a demonstration, (3) the legal standard by which the adequacy of the demonstration will be evaluated and (4) the process by which the public can comment on the demonstration before the agency makes its decision concerning it in the draft permit. One would expect that the antidegradation requirements for OSRW (the Tier II.5 waters) would be at least as demanding as those for high value waters (Tier II waters) set out in subsection 11.3.

   IDEM might consider following the lead of some other states that supplement their implementing regulations with policy guidance to dischargers that further details the desired content for antidegradation demonstrations. IDEM might also draw from voluntary guidance that EPA has issued for antidegradation demonstrations in waters of the Great Lakes.

   IDEM also might consider making the demonstration available for public comment on its website once it has been received. The antidegradation implementing regulations issued under subsection 11.3 specify that the agency provide notice, solicit public comment, and hold a public hearing on the demonstration once received. This could be a good model for the subsection 11.7 regulations. If this provision had been in place as the BP permit was being

considered, many of the issues that surfaced late in the process might have been raised and addressed before the draft permit was made available for comment.

Representatives of all the environmental groups with whom I met urged a recommendation that IDEM complete the promulgation of antidegradation regulations for the state waters other than those that are part of the Great Lakes system. I know this is on the agency's radar screen—and as noted in the Observations above—the decisions that need to be made are contentious and difficult. Nonetheless, clear regulations provide a much needed guide and certainty for industry, the public and the agency to operate against.

2. The states and EPA need to anticipate that permit applications that have the potential to increase the discharges to the Great Lakes or its tributaries, whether or not they involve BCCs, will receive careful scrutiny by the public and public interest groups. Other states might productively review their antidegradation policies and procedures relative to proposed increases in discharges. Antidegradation has long been a difficult issue lurking in the background of water pollution control and many of the difficult issues it presents have not been resolved. Moreover, because most permit actions have become routine and attract little public scrutiny, there may be a tendency on the part of the environmental regulatory agencies to see many of the process steps and the response to comments to be perfunctory. As evidenced in the public concern that has arisen concerning the BP permit, the new reality for major Great Lakes-related actions is that antidegradation policies need to be clear and the permit process needs to be very transparent to assure the quality of decisions and public confidence in them.

3. In this regard, it might be desirable for EPA to convene the permit writers from the states in Region 5 to share their procedures and their experiences implementing their antidegradation policy for the Great Lakes—and to talk through issues they are likely to confront as other permits come up for renewal or there are applications for new permits where the discharge could impact the Great Lakes. Such permits—and the standards a state utilizes to issue them—are inevitably going to be compared to permit actions taken by other states. If the public is to have confidence in the regulatory scheme in place to protect the Great Lakes, potential inconsistencies and problems need to be anticipated and addressed before they generate public controversy.

4. Where, as here, a major reconfiguration or process change is taking place at a facility, it is desirable to consider the major air, water and waste disposal permits at the same time so that the agency and the company can work to ascertain the most effective and efficient (both environmentally and economically) way to address the pollutants and health/environmental risks from the facility's operations. It also is an apt opportunity to look at what recent innovations have been developed with respect to process changes and control technologies that can reduce discharges to the environment. The idea of unified permit actions has its greatest potential to produce gains for all when major changes are taking place. It

is an ideal time to address how process and treatment controls for environmental ends can best be incorporated in the physical changes in the facility.

5. The current minimum technology-based effluent limitation guidelines (ELGs) for petroleum refining promulgated by EPA—which are used by states to establish minimum levels of effluent control in permits they issue—are more than 20 years old. During the past two decades new and enhanced techniques for treating industrial wastewater have been developed and employed—and should provide the underpinning for reviewing/revising the current ELGs. The need to make sure the guidelines are based on a current assessment of technology is particularly important because a number of refineries are planning to switch from sweet crude to the heavier crude drawn from Canadian tar sands and the guidelines need to factor in the implications of the changes in crude oil being processed by refineries today.

6. EPA should provide—on request—more technical assistance to states concerning current waste water treatment technologies available to refineries to help them with the technical assessments in permit reviews. This might be done by establishing an EPA-sponsored clearinghouse or through an EPA mission contract with a firm that has expertise with the petroleum refining industry. It is unrealistic to expect that states, which issue very few permits to refineries, will have a permit writer on staff with expertise in that industry. On the other hand, it is common for EPA to provide such assistance to states concerning technologies available to control various air pollutants—either in house or through the use of contractors.

7. States like Indiana with an interest in retaining old and/or heavy industry that release pollutants of concern to the water, air or land could invest research and development dollars with the public engineering schools in their state to work on the development of viable and cost-effective technologies and processes for those industries to help them meet their environmental responsibilities and to keep them in the state—or to help attract desired new industry to the state. The development of the new or enhanced technologies in turn may generate new business opportunities for exporting the technologies to other states as well as to other countries. Indiana's past investment in the Indiana Clean Manufacturing Technology Institute at Purdue is an example of such an undertaking that could pay multiple dividends for the state.

8. States should make increased utilization of the efficiencies of electronic transmission of—and access to—information to make the permitting process more transparent and to facilitate meaningful public input. This might include, for example, the opening of an electronic docket accessible by the public as permit applications are received, adds other documents as they are received or generated, that allows the public to submit comments on-line, and provides the agency responses to those comments. I found while working on this review that there is considerable variation between states in the ease with which individual

permits and information concerning them could be accessed electronically. I know IDEM has been working on this and has made some good progress—and would like to add a voice of encouragement and support for that undertaking.

The review reinforced the difficult challenge the environmental agencies have in getting timely notice of public hearings and other information to interested parties. There is a need to go beyond the traditional legal notices that are buried in local newspapers and make more effective use of electronic media. Among the suggestions I heard were (1) getting information electronically to environmental and other public interest groups—and then letting them distribute it to their members; (2) allowing members of the public to sign up for various kinds of notifications that subsequently would be electronically generated; and (3) building more time into the permit process at strategic junctures as the notifications of events and comment periods often seems to be received with relatively little advance notice and it can be difficult for interested parties to assemble meaningful comments in a brief period of time, particularly where a group needs to access technical assistance to inform their comments. This might be a good topic for a meeting of state environmental directors where they could exchange best practices and discuss possible enhancements for involving the public.

9. We need a readily accessible data base of the major individual sources and mass of various major pollutants that are (1) allowed and (2) actually discharged into the Great Lakes. It is very difficult for an individual or organization trying to evaluate a discharge to Lake Michigan from a single facility to put that discharge in context of other actual and permitted discharges to the Lake. While understanding from my EPA days that the agency has no shortage of tasks that the public and public officials would like them to undertake, maintaining a data base that provides, by discharger, the mass of major pollutants actually discharged during a calendar year (based on DMRs) and the maximum mass allowed under the existing permit would be a valuable public service—and useful in making evaluations and decisions concerning the Lake.

10. IDEM could enhance the utility of the Fact Sheet it prepares in conjunction with the issuance of a permit with certain additional kinds of information (some of which it provides in Fact Sheets on air permits and some of which are provided, for example, in Fact Sheets prepared by Ohio). These items might include: (1) whether the waters to which the discharge is being permitted are on the list of impaired waters and if so, for which pollutants; (2) information about recent monitored conditions in the area of the outfalls; (3) the location of the nearest drinking water intakes: (4) the enforcement history of the facility since the previous permit was issued; and (5) the estimated actual (based on DMRs) discharges from the facility in the last calendar year.

11. In retrospect it is clear that several misleading headlines or statements in newspaper accounts helped shape public perception of this matter. This is not a case of dumping "sludge" into the Lake as one account suggested. Nor is BP

being permitted to discharge without being "required to build a treatment plant" as a headline indicated. The permitted discharge does not threaten drinking water supplies nor portend beach closings. On the other hand, the matter does legitimately raise the issue of whether an increase in discharge levels can reasonably be avoided—or if not—whether the increase is in the overall public interest due to other social and economic considerations.

The experience here suggests that it is desirable for state agencies—when considering and issuing major permits to major dischargers affecting the Great Lakes—or where there is a requested increase in discharge limits—to sit down with environmental reporters for local (and regional) newspapers/media outlets, and in some cases with editorial boards, to provide background briefings on the environmental and economic dimensions of the permit. This will not insure that misleading statements and stories will not appear; but it should facilitate understanding on the part of editors and reporters of the actual facts and considerations. Of course, those reporters and editors also have a responsibility for accuracy in the stories they carry in light of the important role they have fostering an informed public—and public discourse on important issues.